CLAIMS

1. Method for locating a mobile terminal (MS, MS2, ...) within a mobile communication network comprising at least one base station (BTS1, BTS2, ..., BTSn), the method comprising the measurement of a set of physical dimensions that identify, according to respective functions, locating co-ordinates (x, y, z) of said mobile terminal, characterised in that it comprises the steps of:

- generating, starting from said set of physical dimensions and respective functions, a global locating error function (ϕ) which has a minimum for values of said locating co-ordinates (x, y, z) corresponding with the position occupied by said mobile terminal,

- seeking the minimum of said error function (ϕ) by varying at least one of said locating co-ordinates (x, y, z), and

- locating said mobile terminal in correspondence with the value of said at least one locating co-ordinate corresponding to said minimum.

2. Method as claimed in claim 1, characterised in that said set of physical dimensions comprises at least a dimension selected within the group constituted by:

- signal power received by said mobile terminal starting from said at least one base station,
- Timing Advance (TA),
- Observed Time Differences (OTD), and
- Time of Arrival (TOA).

3. Method as claimed in claim 1 or 2 characterised in that the measuring step comprises the step of

- performing measurements able to identify at least a value of position or distance with determined precision.

4. Method as claimed in claim 1, 2 or 3, characterised in that said global error function is defined as the variance

of the dimensions included in said set and a dimension whose value is zero.

5. Method as claimed in claim 1, 2 or 3, characterised in that said global error is defined as the mean square error of the dimensions of said set.

6. Method as claimed in any of the previous claims, characterised in that said global error function (ϕ) is obtained starting from a plurality of dimensions of said set.

7. Method as claimed in claim 1, 2 or 3, characterised in that said set comprises one single dimension, so that said global error function (ϕ) is generated starting from the single dimension of said set.

8. Method as claimed in any of the previous claims, characterised in that it comprises, to seek said minimum, the execution of an iterative process evaluating of said global error function for different values of said at least one location co-ordinate (x_0, y_0, z_0...; x_n, y_n, z_n) corresponding to successive different points of the space covered by said communication network.

9. Method as claimed in claim 8, characterised in that it comprises the step of interrupting said iterative process when the absolute distance between two successive points is below a determined threshold value.

10. Method as claimed in any of the previous claims, characterised in that it is applicable in a three-dimensional reference system.

11. System for locating a mobile terminal (MS1, MS2, ...) within a mobile communication network comprising at least one base station (BTS1, BTS2, ... BTSn), the system comprising at least a locating module (PCF) configured to measure a set of physical dimensions that identify according to respective functions location co-ordinates (x, y, z) of said mobile terminal, characterised in that said locating module (PCF) is configured to:

- generate, starting from said set of physical dimensions and respective functions, a global locating error function (ϕ) which allows a minimum for values of said locating co-ordinates (x, y, z) corresponding with the position occupied by said mobile terminal,

- seek the minimum of said error function (ϕ) varying at least one of said locating co-ordinates (x, y, z), and

- locate said mobile terminal in correspondence with the value of said at least one locating co-ordinate (x, y, z) corresponding to said minimum.

12. System as claimed in claim 11, characterised in that said set of physical dimensions comprises at least one dimension selected in the group constituted by:

- signal power received by said mobile terminal starting from said at least one base station,

- Timing Advance (TA),

- Observed Time Differences (OTD), and

- Time of Arrival (TOA).

13. System as claimed in claim 11 or claim 12, characterised by measuring devices able to obtain measurements to identify at least a position value of said mobile terminal or distance with a determined precision.

14. System as claimed in claim 11, 12 or 13, characterised in that said global error function is defined as the variance of the dimensions included in said set and a dimension whose value is zero.

15. System as claimed in claim 11, 12 or 13, characterised in that said global error function is defined as the mean square error of the dimensions of said set.

16. System as claimed in claim 11, 12 or 13, characterised in that said locating module (PCF) is configured to obtain said global error function (ϕ) starting from a plurality of dimensions of said set.

17. System as claimed in claim 11, 12 or 13, characterised in that said locating module (PCF) configured to obtain said global error function (ϕ) starting from said set comprises one single dimension, so that said global error function (ϕ) is generated starting from the single dimension of said set.

18. System as claimed in any of the claims from 11 through 17, characterised in that to seek said minimum, said locating module (PCF) is configured to carry out an iterative process for evaluating said global error function for different values of said at least one locating co-ordinate (x_0, y_0, z_0;...; x_n, y_n, z_n) corresponding to the successive different points of the space covered by said communication network.

19. System as claimed in claim 18, characterised in that said locating module (PCF) is configured to interrupt said iterative process when the absolute distance between two successive points is below a determined threshold value.

20. System as claimed in any of the claims from 11 to 19 characterised in that said error function (ϕ) is able to operate in a three-dimensional reference system.

21. System as claimed in any of the claims from 11 to 20, characterised in that it further comprises a module (MGC) to allow the exchange of data between said mobile terminal and said at least one base station to identify at least one dimension of said set.

22. Mobile terminal configured for use in a system as claimed in any of the claims from 11 to 21, characterised in that the terminal comprises at least part of said locating module (PCF) integrated in the mobile terminal itself.

23. Software product able to be loaded directly into a memory of a digital computer associated with a mobile terminal (MS1, MS2,...) as claimed in claim 22 and comprising portions of software code able to implement said at least

part of said locating module (PCF) integrated in the mobile terminal itself when said software product is run on said digital computer.

24. Communication network comprising at least a base station (BTS1, BTS2, ... BTSn) and a plurality of mobile terminals (MS1, MS2, ...), the network comprising a locating system as claimed in any of the claims from 11 to 21.

25. Communication network as claimed in claim 24, characterised in that it comprises an interface module (GW) for interfacing with an IP network, said interface module being configured in such a way as to allow the transfer of at least one between:

- an order to locate one of said mobile terminals starting from a source (U) connected to said IP network, and
- a delivery information generated by a source (U) connected to said IP network, directed to said mobile terminals (MS1, MS2, ...) and referred to the location of at least one of said mobile terminals.